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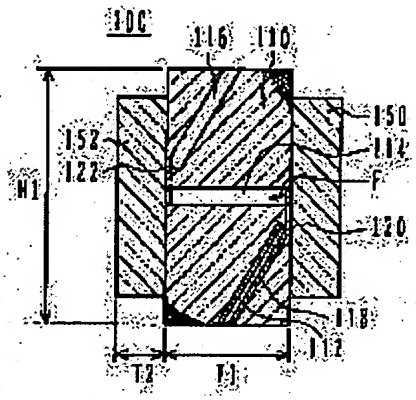
(54) LIQUID CHROMATOGRAPH DEVICE

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a liquid chromatograph device having a low cell which can be used without being replaced even if a flow passage is clogged.

SOLUTION: A flow cell 100 comprises a cell body 110 having an inlet flow passage 112, a detection flow passage 114, and an outlet flow passage 116, and windows 120, 122 which are secured to the cell body 110 at both ends of detection flow passage 114. The inlet flow passage 112 is formed by inserting a tube 118 intimately into formed in the cell body 110.



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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to liquid chromatograph equipment, and relates to liquid chromatograph equipment equipped with the suitable flow cell to use it for micro LC especially.
[0002]
[Description of the Prior Art] In conventional liquid chromatograph equipment, a flow cell which is indicated by JP,8-184551,A is used as the detector. Generally a quartz, stainless steel, etc. with sufficient chemical resistance are used for the cel body of a flow cell. Synthetic quartz is used for the aperture which makes detection light penetrate, and when the cel body is a quartz, optical adhesion of the cel body and the aperture is carried out. It connects between inlet-port passage, outlet passage, and such inlet-port passage and outlet passage, and the passage of the cel body made from a quartz consists of detection passage through which detection light passes, and these passage configurations are passage of Z mold in which an aperture is made to apply and reflect the eluate passing through inlet-port passage, and are made to lessen flow separation.
[0003]
[Problem(s) to be Solved by the Invention] In recent years, an environmental problem becomes important and waste fluid processing costs, such as an organic solvent, are going up. It is required that the amount of the eluate used used for liquid chromatograph equipment (flow rate) should also be reduced in connection with this. In order to make diffusion of a sample small with the formation of a small flow rate of an eluate, it is necessary to make a column, a flow cell, and passage of piping small. When a sample is spread, the width of face of the peak of chromatogram becomes large, and it becomes impossible for a peak to detect separation of a near sample component.
[0004] A column and passage of piping can be made small. However, if the path of the detection passage of a flow cell is made small, the quantity of light of detection light will become less, and a S/N ratio will worsen. Then, although diffusion of a sample needed to be reduced without making the path of detection passage small, there were the following three problems at that time.
[0005] 1. In the flow cell of the conventional structure, in order to reduce diffusion of a sample, when inlet-port passage was made thin, it tends to have got inlet-port passage blocked and inlet-port passage was got blocked with the sludge of an eluate and a sample, there was a problem that the flow cell itself had to be exchanged.
[0006] 2. Moreover, when a quartz is used for the cel body of a flow cell, form passage, such as inlet-port passage and detection passage, with the ultrasonic rotary processing machine. However, the diameter of min of a processing tool which can be manufactured is phi 0.4, and the trim size of phi 0.5 of perforation of the quartz by the ultrasonic rotary processing machine is min. Therefore, inlet-port passage could not be made thinner than this, but there was a problem that diffusion of a sample became large, in the flow cell made from a quartz.
[0007] 3. In the passage of the further conventional Z mold, when not making the path of detection passage small, flow stagnated in the corner of detection passage and there was a problem that the

residual of a sample increased.
[0008] The 1st purpose of this invention is to offer liquid chromatograph equipment equipped with the usable flow cell, without exchanging the flow cell itself also to plugging of passage.
[0009] The 2nd purpose of this invention is to offer liquid chromatograph equipment equipped with the flow cell made from a quartz with the small diameter of inlet-port passage.
[0010] Even if the 3rd purpose of this invention does not make the path of detection passage small, it is to offer the liquid chromatograph [which there is not and was equipped with the small flow cell of diffusion] equipment as for which the residual of a sample becomes empty.
[0011]
[Means for Solving the Problem] In order to attain the 1st purpose of the above, (1) This invention In the liquid chromatograph equipment which has the flow cell into which the sample separated by the column which separates a sample, and this column flows, and has the detector which detects this separated sample component While the above-mentioned flow cell consists of the cel body which has inlet-port passage, detection passage, and outlet passage, and an aperture fixed to the both-ends side of the above-mentioned detection passage by the above-mentioned cel body It has the tube which it was inserted in the hole formed in the above-mentioned cel body, and was stuck, and the above-mentioned inlet-port passage is formed by the hole inside this tube. By this configuration, even if it gets inlet-port passage blocked, it becomes reusable by exchanging tubes, without exchanging the flow cell itself.
[0012] In order to attain the 2nd purpose of the above, (2) This invention In the liquid chromatograph equipment which has the flow cell into which the sample separated by the column which separates a sample, and this column flows, and has the detector which detects this separated sample component While the above-mentioned flow cell consists of the cel body made from a quartz which has inlet-port passage, detection passage, and outlet passage, and an aperture fixed to the both-ends side of the above-mentioned detection passage by the above-mentioned cel body It has the tube which it was inserted in the hole formed in the above-mentioned cel body, and was stuck, and the above-mentioned inlet-port passage is formed by the hole inside this tube. By this configuration, also in the flow cell made from a quartz, the diameter of inlet-port passage can be made small, and diffusion of a sample can be reduced.
[0013] (3) In the above (1) or (2), preferably, the hole formed in the above-mentioned cel body is a taper-like, and the appearance of the above-mentioned tube makes it the shape of a taper. By this configuration, the tip of a tube can be stopped easily.
[0014] (4) The hole formed in the above-mentioned cel body is a configuration with a stage, and make it stop the tip of the above-mentioned tube in this section with a stage preferably in the above (1) or (2). By this configuration, the tip of a tube can be stopped easily.
[0015] (5) In the above (1) or (2), preferably, the above-mentioned tube has chemical resistance and consists of ingredients which can be deformed plastically.
[0016] In order to attain the 3rd purpose of the above, (6) This invention In the liquid chromatograph equipment which has the flow cell into which the sample separated by the column which separates a sample, and this column flows, and has the detector which detects this separated sample component While the above-mentioned flow cell consists of the cel body which has inlet-port passage, detection passage, and outlet passage, and an aperture fixed to the both-ends side of the above-mentioned detection passage by the above-mentioned cel body It is formed in the above-mentioned cel body, and while carrying out splitting of the flow which flows out of the above-mentioned inlet-port passage, it has the connection slot made to join at the inlet port of the above-mentioned detection passage, so that the above-mentioned inlet-port passage and the above-mentioned detection passage may be connected. By this configuration, the residual of the sample in the corner of the connection of inlet-port passage and detection passage may be lessened.
[0017] (7) In the above (6), preferably, the above-mentioned connection slot is formed in the above-mentioned cel body in the shape of a circular ring, and the above-mentioned inlet-port passage is connected in a part of circular ring connection slot on the above, and connect the above-mentioned detection passage to the circular ring connection slot on the above by the position of symmetry to the connection of the above-mentioned inlet-port passage and the above-mentioned connection slot. By this

configuration, the flow shunted toward two joins in the inlet-port section of detection passage, and may make small diffusion in the connection of inlet-port passage and detection passage.
[0018]
[Embodiment of the Invention] Hereafter, the liquid chromatograph equipment by 1 operation gestalt of this invention is explained using drawing 1 - drawing 5 . First, drawing 1 is used and the whole liquid chromatograph equipment configuration by 1 operation gestalt of this invention is explained. Drawing 1 is the block diagram showing the whole liquid chromatograph equipment configuration by 1 operation gestalt of this invention.
[0019] The amount liquid sending of steady flow of the eluates 10 and 12 is pressurized and carried out with pumps 20 and 22, respectively. Generally with this operation gestalt, the following small flow rates are used by 0.2ml/. In the sample injector 30, a sample 32 is introduced all over the passage where eluates 10 and 12 flow through the high-pressure passage change bulb 38 with a syringe 34 and a needle 36.
[0020] The introduced sample 32 is the column 42 in the column thermostat 40, and is separated for every component. Generally with this operation gestalt, a microbore column with a bore of 2mm or less is used. The leached moiety from a column 42 is observed as a peak by the flow cell 100 in a detector 50, and a component quantum is performed from the height or area of a peak.
[0021] A penetrant remover 60 is introduced by a syringe 34 and the needle 36 all over passage through the high-pressure passage change bulb 38. The sample and eluate which detection ended are discarded by the waste fluid bottle 62.
[0022] Next, the configuration of the flow cell by this operation gestalt is explained using drawing 2 and drawing 3 . Drawing 2 is the sectional view showing the cross-section configuration of the flow cell used for the liquid chromatograph equipment by 1 operation gestalt of this invention, and drawing 3 is the right side view of drawing 2 .
[0023] The flow cell 100 is constituted by the cel body 110 and the aperture material 150,152. The cel body 110 is formed with the opaque black quartz. The cel body 110 has the shape of a cylindrical shape which has the 2nd parallel page mutually, the thickness T1 is 5mm, and the height H1 of a parallel part is [the radius R1 of a circular part is 7mm, and] 12mm. In addition, although a transparent quartz can also be used as the cel body 110, for reducing the effect of the stray light, a black quartz is desirable. The aperture material 150,152 is formed with the transparent quartz. The thickness T2 of the aperture material 150,152 is 2mm, and a radius R2 is 5mm. Optical adhesion of the aperture material 150,152 is carried out at the end face parallel to each other of the cel body 110.
[0024] The cel body 110 is equipped with the inlet-port passage 112 arranged in the shape of Z character, the detection passage 114, and the outlet passage 116. The perforating process of the detection passage 114 and the outlet passage 116 is carried out by the tool of an ultrasonic rotary processing machine. The bore of the detection passage 114 and the outlet passage 116 is phi0.75mm, respectively.
[0025] The inlet-port passage 112 inserts a tube 118, and is having the inlet-port passage 112 formed of the through hole of a tube 118 into the hole by which the perforating process was beforehand carried out by the tool of an ultrasonic rotary processing machine. As a tube 118, 4 fluoridation ethylene excellent in chemical resistance is used. Moreover, as other ingredients, it excels in chemical resistance and the tube made from Tori Flon or polypropylene can also be used by pushing an edge, after inserting in a hole as an ingredient which is easy to deform plastically.
[0026] The bore of the hole formed by the ultrasonic rotary processing machine is phi0.8mm, and inserts into this the tube 118 whose outer diameter is phi0.75mm. It does not penetrate completely but the tip of the hole for inlet-port passage formation serves as a stopper to the point of a tube 118 so that it may mention later. After inserting a tube 118 into the hole for inlet-port passage formation, by pushing the edge of which the tube 118 is sticking out, a tube 118 is deformed plastically and the external surface of a tube 118 sticks it to the internal surface of the hole for inlet-port passage formation. The inlet-port passage 112 is formed inside a tube 118, and the bore has become phi0.2mm. The part projected from the cel body 110 of a tube 118 is cut. By such approach, insertion of a tube is stabilized and it can make loose fit tolerance of a tube 118 and the hole of the cel body 110. Moreover, a tube 118 can prevent

migration of a tube 118 by sticking to a hole.
[0027] Namely, although min was also phi0.5mm and was impossible for processing a hole thinner than this, the diameter of the hole formed in the cel body 110 made from a quartz by the conventional ultrasonic rotary processing machine With this operation gestalt, the bore phi0.2mm conventionally impossible inlet-port passage 112 can be formed by inserting a tube 118 in the hole formed more greatly, and a tube being made to be stuck in this hole.
[0028] The bore of the detection passage 114 is phi0.75mm, and since it was equivalent to the former, and the quantity of light of detection light did not become less and the bore of the inlet-port passage 112 was made [a S/N ratio was not able to fall and] small with phi0.2mm, even if a flow rate becomes small, diffusion of the sample in inlet-port passage can be prevented.
[0029] Moreover, in this operation gestalt, although the problem of the blinding of the inlet-port passage 112 by deposit of a sample is also generated by setting the bore of the inlet-port passage 112 to phi0.2mm, since a tube 118 is inserted and he is trying to form the inlet-port passage 112, it is only exchanging tubes and the reuse of a flow cell becomes possible. Exchange of a tube thrusts the drill of a somewhat larger path than the bore of a tube 118 into the inlet-port passage 112 inside a tube 118, and straight length ****** can perform it easily. To having exchanged the expensive flow cell itself conventionally, since only exchange of a tube is required, exchange costs can be made cheap.
[0030] Furthermore, in this operation gestalt, the connection slot 122 is established in the part which establishes the connection slot 120 in the part which connects the inlet-port passage 112 and the detection passage 114, and connects the detection passage 114 and the outlet passage 116 to it. Since the connection slot 120 and the connection slot 122 are carrying out the same configuration, they explain the configuration of the connection slot 120 here using drawing 3 .
[0031] As shown in drawing 3 , the connection slot 120 is a circular ring-like slot. The bore r3 of the connection slot 120 is phi0.6mm, an outer diameter r4 is phi1.6mm, and the depth is 0.2mm. The edge of the inlet-port passage 112 is carrying out opening, and is connected to the lower limit side of illustration into the connection slot 120 by the upper limit side of illustration of the connection slot 120 in the detection passage 114. That is, 2 ****s of the passage from the inlet-port passage 112 to the detection passage 114 are set to connection slot 120A and connection slot 120B. The sample which flowed out of the edge of the inlet-port passage 112 into the connection slot 120 serves as flow which joins in the edge of the detection passage 114, after being shunted toward connection slot 120A and connection slot 120B. In the unification section, as shown in drawing 3 , flow FA of a sample and the flow FB of a sample will join, and it will flow into the detection passage 114 after that as flow [of the sample shown in drawing 2] F. That is, since a sample will flow into the detection passage 114 from a 2-way and a sample stops being able to pile up in it easily, it is lost that the sample by the stagnation section of the flow of a sample arising in the connection of inlet-port passage and detection passage is spread like before.
[0032] Since the bore of the inlet-port passage 112 is phi0.2mm, the cross section is 2 about 0.03mm. On the other hand, since the bore of the detection passage 114 is phi0.75mm, the cross section is 2 about 0.44mm. The cross-section configuration of the connection slots 120A and 120B which connect both is a rectangle with a depth of 0.2mm by width of face of 0.5mm, the cross section is 2 0.1mm, and the sum total of the cross section of two connection slots 120A and 120B is 2 0.2mm. That is, he is trying to prevent stagnation of a sample also by making the cross section become large gradually with the inlet-port passage 112, the connection slot 120, and the detection passage 114, and preventing the abrupt change of a flow passage area.
[0033] Here, the tool of the ultrasonic rotary processing machine for forming the connection slot 120 is explained using drawing 4 . Drawing 4 is the sectional view of the tool of the ultrasonic rotary processing machine for connection slot formation of the flow cell of the liquid chromatograph equipment by 1 operation gestalt of this invention.
[0034] The tip of the tool 200 made from stainless steel serves as the shape of a ring whose bore d2 is phi0.7mm so that it may illustrate whose outer diameter d1 is phi1.5mm, and the depth L1 is 1mm. And #230 diamond abrasive grain 210 is electrodeposited from the point by the front face to a part whose die

length L2 is 2mm.
[0035] By using this tool 200, the outer-diameter phi1.6mm connection slot 120 can be formed by bore phi0.6mm.
[0036] Here, the FUROMATO gram obtained by the liquid chromatograph equipment using the flow cell by this operation gestalt is explained using drawing 5 . Drawing 5 is the explanatory view of the FUROMATO gram obtained by the liquid chromatograph equipment by 1 operation gestalt of this invention.
[0037] In drawing 5 , an axis of abscissa shows the holding time and the axis of ordinate shows the amount of signals. Moreover, the broken line shows the chromatogram obtained using the conventional flow cell, and the continuous line shows the chromatogram obtained using the flow cell by this operation gestalt. As a conventional flow cell, it is phi1.5mm, and as a Measuring condition, the bore of inlet-port passage and detection passage considers a flow rate as a part for 1ml/, and is setting the diameter of a column to phi4.0mm. In this operation gestalt, as mentioned above, the bore of inlet-port passage is phi0.2mm, the bore of detection passage is phi0.75mm, a flow rate is considered as a part for 0.2ml/, and the diameter of a column is set to phi1.5mm. Other Measuring conditions are made equal.
[0038] Since diffusion by the flow cell is suppressed compared with the peak 310 from which the peak 300 acquired according to this operation gestalt is acquired in the conventional example, each component is observed as a sharp higher peak. For this reason, the quantum of a minute amount becomes possible by high separation more.
[0039] Especially, at the peak 300 by this operation gestalt, half-value width H1 is narrow compared with the former, and this is mainly because the diameter of inlet-port passage was narrowed with phi0.2mm.
[0040] Moreover, it is because the width of face H3 in the second half of the peak core in the location of 1/10 of height became near with the width of face H2 in the first half of a peak, the symmetric property of a peak was improving to the height of a peak, and this prevented stagnation of a sample mainly as it prepared a connection slot and passed a sample from a 2-way to detection passage.
[0041] Since the bore of inlet-port passage was made small by considering as the method which inserts a tube according to this operation gestalt even when the cel body made from a quartz was used as explained above, even if a flow rate becomes small, diffusion of the sample in inlet-port passage can be prevented.
[0042] Moreover, since the reuse of a flow cell becomes possible only by exchanging tubes, without exchanging the flow cell itself even when inlet-port passage produces blinding, exchange costs can be made cheap.
[0043] Furthermore, since a sample stops being able to pile up easily by passing a sample from a 2-way to detection passage so that inlet-port passage and detection passage may be connected by the connection slot, it is lost like before that a sample is spread in the connection of inlet-port passage and detection passage.
[0044] Next, the liquid chromatograph equipment by the 2nd operation gestalt of this invention is explained using drawing 6 and drawing 7 . Drawing 6 shows the cross-section configuration of the flow cell by this operation gestalt, and drawing 7 shows the right lateral of drawing 6 . In addition, the whole liquid chromatograph equipment configuration by this operation gestalt is the same as that of what was shown in drawing 1 . Moreover, the same sign as drawing 2 and drawing 3 shows the same part.
[0045] In this operation gestalt, the hole for inlet-port passage formation is used as a through hole, tube 118A is inserted in the through hole, and the aperture material 150 is used as the stopper of tube 118A.
[0046] Flow cell 100A is constituted by the transparent aperture material 150,152 made from a quartz by which optical adhesion was carried out at cel body 110A made from a black quartz, and cel body 110A. Cel body 110A is equipped with inlet-port passage 112A arranged in the shape of Z character, the detection passage 114, and the outlet passage 116. Inlet-port passage 112A and the detection passage 114 are connected by the connection slot 120, and the detection passage 114 and the outlet passage 116 are connected by the connection slot 122.
[0047] Inlet-port passage 112A inserts tube 118A made from 4 fluoridation ethylene, and is having

inlet-port passage 112A formed of the through hole of tube 118A into the hole by which the perforating process was beforehand carried out by the tool of an ultrasonic rotary processing machine. Here, in order to insert tube 118A, the hole formed in cel body 110A is used as the through hole. Tube 118A is inserted in the through hole, and the aperture material 150 is used as the stopper of tube 118A. Where tube 118A is stopped by the aperture material 150 after inserting in a through hole, by pushing the edge of which tube 118A is sticking out, tube 118A deforms plastically, the external surface of tube 118A sticks to the internal surface of the hole for inlet-port passage formation, and inlet-port passage 112A is formed inside tube 118A. In addition, in order to enable circulation of inlet-port passage 112A and the connection slot 120, slitting is formed at the tip of tube 118A.

[0048] Here, the hole for insertion of tube 118A is written as a through hole, and becomes easy [the cutting] compared with the hole which has a stopper part as shown in drawing 2 .

[0049] The bore of the detection passage 114 is phi0.75mm, and since the quantity of light of detection light did not become less, a S/N ratio was not able to fall and the bore of inlet-port passage 112A was made small with phi0.2mm, even if a flow rate becomes small, diffusion of the sample in inlet-port passage can be prevented.

[0050] Moreover, even when the blinding of inlet-port passage 112A by deposit of a sample occurs by setting the bore of inlet-port passage 112A to phi0.2mm, the reuse of a flow cell becomes possible only by exchanging tube 118A.

[0051] Furthermore, in this operation gestalt, since he is trying to connect the detection passage 114 with inlet-port passage 112A using the connection slot 120, and a sample stops being able to pile up easily in the connection parts of inlet-port passage 112A and the detection passage 114, it is lost that a sample is spread.

[0052] Since the bore of inlet-port passage was made small even when the cel body made from a quartz was used while processing of the hole which inserts a tube became easy according to this operation gestalt, as explained above, even if a flow rate becomes small, diffusion of the sample in inlet-port passage can be prevented.

[0053] Moreover, since the reuse of a flow cell becomes possible only by exchanging tubes, without exchanging the flow cell itself even when inlet-port passage produces blinding, exchange costs can be made cheap.

[0054] Furthermore, it is lost by passing a sample from a 2-way to detection passage that a sample is spread in the connection of inlet-port passage and detection passage so that inlet-port passage and detection passage may be connected by the connection slot.

[0055] Next, the liquid chromatograph equipment by the 3rd operation gestalt of this invention is explained using drawing 8 and drawing 9 . Drawing 8 shows the cross-section configuration of the flow cell by this operation gestalt, and drawing 9 shows the right lateral of drawing 8 . In addition, the whole liquid chromatograph equipment configuration by this operation gestalt is the same as that of what was shown in drawing 1 . Moreover, the same sign as drawing 2 and drawing 3 shows the same part.

[0056] In this operation gestalt, the hole for inlet-port passage formation is made into the shape of a taper, an appearance inserts taper-like tube 118B in this tapered bore, and the inlet-port passage aperture material 150 is used as the stopper of tube 118B.

[0057] Flow cell 100B is constituted by the transparent aperture material 150,152 made from a quartz by which optical adhesion was carried out at cel body 110B made from a black quartz, and cel body 110B. Cel body 110B is equipped with inlet-port passage 112B arranged in the shape of Z character, the detection passage 114, and the outlet passage 116. Inlet-port passage 112B and the detection passage 114 are connected by the connection slot 120, and the detection passage 114 and the outlet passage 116 are connected by the connection slot 122.

[0058] Inlet-port passage 112B inserts tube 118B made from 4 fluoridation ethylene, and is having inlet-port passage 112B formed of the through hole of tube 118B into the hole by which the perforating process was beforehand carried out by the tool of an ultrasonic rotary processing machine. Here, in order to insert tube 118B, the hole formed in cel body 110B is phi0.5mm, and has processed the path by the side of the detection passage 114 in the shape of [of tapers 1/10] a taper. To the through hole of the

shape of this taper, by diameter phiof tip0.55mm, tube 118B of tapers 1/10 is inserted, and insertion of tube 118B stops with fitting of the taper section. Where tube 118B is stopped after inserting in a taper-like through hole, by pushing the edge of which tube 118B is sticking out, tube 118B deforms plastically, the external surface of tube 118B sticks to the internal surface of the hole for inlet-port passage formation, and inlet-port passage 112B is formed inside tube 118B.

[0059] The bore of the detection passage 114 is phi0.75mm, and since the quantity of light of detection light did not become less, a S/N ratio was not able to fall and the bore of inlet-port passage 112B was made small with phi0.2mm, even if a flow rate becomes small, diffusion of the sample in inlet-port passage can be prevented.

[0060] Moreover, even when the blinding of inlet-port passage 112B by deposit of a sample occurs by setting the bore of inlet-port passage 112B to phi0.2mm, the reuse of a flow cell becomes possible only by exchanging tube 118B.

[0061] Furthermore, in this operation gestalt, since he is trying to connect the detection passage 114 with inlet-port passage 112B using the connection slot 120, and a sample stops being able to pile up easily in the connection parts of inlet-port passage 112B and the detection passage 114, it is lost that a sample is spread.

[0062] Since the bore of inlet-port passage was made small according to this operation gestalt even when the cel body made from a quartz was used as explained above, even if a flow rate becomes small, diffusion of the sample in inlet-port passage can be prevented.

[0063] Moreover, since the reuse of a flow cell becomes possible only by exchanging tubes, without exchanging the flow cell itself even when inlet-port passage produces blinding, exchange costs can be made cheap.

[0064] Furthermore, it is lost by passing a sample from a 2-way to detection passage that a sample is spread in the connection of inlet-port passage and detection passage so that inlet-port passage and detection passage may be connected by the connection slot.

[0065] Next, the liquid chromatograph equipment by the 4th operation gestalt of this invention is explained using drawing 10 . Drawing 10 shows the cross-section configuration of the flow cell by this operation gestalt. In addition, the whole liquid chromatograph equipment configuration by this operation gestalt is the same as that of what was shown in drawing 1 . Moreover, the same sign as drawing 2 shows the same part.

[0066] In this operation gestalt, the hole which inserts tube 118C in order to form inlet-port passage is processed on the hole with a stage.

[0067] Flow cell 100C is constituted by the transparent aperture material 150,152 made from a quartz by which optical adhesion was carried out at cel body 110C made from a black quartz, and cel body 110C. Cel body 110C is equipped with inlet-port passage 112C arranged in the shape of Z character, the detection passage 114, and the outlet passage 116. Moreover, the detection passage 114 and the outlet passage 116 are connected by the connection slot 122. In addition, in this operation gestalt, it connects with the detection passage 114 and the inlet-port passage 112 has not prepared the connection slot as shown in drawing 2 directly.

[0068] Inlet-port passage 112C inserts tube 118C made from 4 fluoridation ethylene, and is having inlet-port passage 112C formed of the through hole of tube 118C into the hole by which the perforating process was beforehand carried out by the tool of an ultrasonic rotary processing machine. Here, in order to insert tube 118C, the hole formed in cel body 110C is used as the hole with a stage which has the section 124 with a stage on the way while it is a through hole. By inserting tube 118C in this through hole, and pushing the edge of which tube 118C is sticking out, after the tip of tube 118C has stopped in the section 124 with a stage, tube 118C deforms plastically, the external surface of tube 118C sticks to the internal surface of the hole for inlet-port passage formation, and inlet-port passage 112C is formed inside tube 118C.

[0069] Here, the tool of the ultrasonic rotary processing machine for forming the through hole to which the section 124 with a stage was attached using drawing 11 is explained.

[0070] The tip of tool 200A made from stainless steel forms the part whose outer diameter d4 is

phi0.4mm and which became thin in the point of the part whose outer diameter d3 is phi0.7mm so that it may illustrate. And #230 diamond abrasive grain 210A is electrodeposited from the point by the front face to a part whose die length L4 die length L3 is 2mm in 3mm.
[0071] By using this tool 200A, that through hole with a bore phi0.5mm stage can be first formed by bore phi0.8mm to the middle. Therefore, floor to floor time is reduced by processing it with a processing tool with a stage.
[0072] The bore of the detection passage 114 is phi0.75mm, and since the quantity of light of detection light did not become less, a S/N ratio was not able to fall and the bore of inlet-port passage 112C was made small with phi0.2mm, even if a flow rate becomes small, diffusion of the sample in inlet-port passage can be prevented.
[0073] Moreover, even when the blinding of inlet-port passage 112C by deposit of a sample occurs by setting the bore of inlet-port passage 112C to phi0.2mm, the reuse of a flow cell becomes possible only by exchanging tube 118C.
[0074] Since the bore of inlet-port passage was made small according to this operation gestalt even when the cel body made from a quartz was used as explained above, even if a flow rate becomes small, diffusion of the sample in inlet-port passage can be prevented.
[0075] Moreover, since the reuse of a flow cell becomes possible only by exchanging tubes, without exchanging the flow cell itself even when inlet-port passage produces blinding, exchange costs can be made cheap.
[0076] Next, the liquid chromatograph equipment by the 5th operation gestalt of this invention is explained using drawing 12 . Drawing 12 shows the cross-section configuration of the flow cell by this operation gestalt. In addition, the whole liquid chromatograph equipment configuration by this operation gestalt is the same as that of what was shown in drawing 1 . Moreover, the same sign as drawing 2 shows the same part.
[0077] Flow cell 100D is constituted by the transparent aperture material 150,152 made from a quartz by which optical adhesion was carried out at cel body 110D made from a black quartz, and cel body 110D. Cel body 110D is equipped with inlet-port passage 112D arranged in the shape of Z character, the detection passage 114, and the outlet passage 116. In addition, in this operation gestalt, it connects with the detection passage 114 and the inlet-port passage 112 and the outlet passage 116 have not prepared the connection slot as shown in drawing 2 directly.
[0078] Inlet-port passage 112D inserts tube 118D made from 4 fluoridation ethylene, and is having inlet-port passage 112D formed of the through hole of tube 118D into the hole by which the perforating process was beforehand carried out by the tool of an ultrasonic rotary processing machine. By inserting tube 118D in the through hole formed in the cel body 110, and pushing the edge of which tube 118D is sticking out, after the tip of tube 118D has stopped, tube 118D deforms plastically, the external surface of tube 118D sticks to the internal surface of the hole for inlet-port passage formation, and inlet-port passage 112D is formed inside tube 118D.
[0079] The bore of the detection passage 114 is phi0.75mm, and since the quantity of light of detection light did not become less, a S/N ratio was not able to fall and the bore of inlet-port passage 112D was made small with phi0.2mm, even if a flow rate becomes small, diffusion of the sample in inlet-port passage can be prevented.
[0080] Moreover, even when the blinding of inlet-port passage 112D by deposit of a sample occurs by setting the bore of inlet-port passage 112D to phi0.2mm, the reuse of a flow cell becomes possible only by exchanging tube 118D.
[0081] Since the bore of inlet-port passage was made small according to this operation gestalt even when the cel body made from a quartz was used as explained above, even if a flow rate becomes small, diffusion of the sample in inlet-port passage can be prevented.
[0082] Moreover, since the reuse of a flow cell becomes possible only by exchanging tubes, without exchanging the flow cell itself even when inlet-port passage produces blinding, exchange costs can be made cheap.
[0083] Next, the liquid chromatograph equipment by the 6th operation gestalt of this invention is

explained using drawing 13 . Drawing 13 shows the cross-section configuration of the flow cell by this operation gestalt. In addition, the whole liquid chromatograph equipment configuration by this operation gestalt is the same as that of what was shown in drawing 1 . Moreover, the same sign as drawing 2 shows the same part.

[0084] In this operation gestalt, the hole which inserts tube 118E in order to form inlet-port passage is processed on the hole with a stage.

[0085] Flow cell 100E is constituted by the transparent aperture material 150,152 made from a quartz by which optical adhesion was carried out at cel body 110E made from a black quartz, and cel body 110E. Cel body 110E is equipped with inlet-port passage 112E arranged in the shape of Z character, the detection passage 114, and the outlet passage 116. In addition, in this operation gestalt, it connects with the detection passage 114 and the inlet-port passage 112 and the outlet passage 116 have not prepared the connection slot as shown in drawing 2 directly.

[0086] Inlet-port passage 112E inserts tube 118E made from 4 fluoridation ethylene, and is having inlet-port passage 112E formed of the through hole of tube 118E into the hole by which the perforating process was beforehand carried out by the tool of an ultrasonic rotary processing machine. Here, in order to insert tube 118E, the hole formed in cel body 110E is used as the hole with a stage which has the section 124 with a stage on the way while it is a through hole. By inserting tube 118E in this through hole, and pushing the edge of which tube 118E is sticking out, after the tip of tube 118E has stopped in the section 124 with a stage, tube 118E deforms plastically, the external surface of tube 118E sticks to the internal surface of the hole for inlet-port passage formation, and inlet-port passage 112E is formed inside tube 118E.

[0087] The bore of the detection passage 114 is phi0.75mm, and since the quantity of light of detection light did not become less, a S/N ratio was not able to fall and the bore of inlet-port passage 112E was made small with phi0.2mm, even if a flow rate becomes small, diffusion of the sample in inlet-port passage can be prevented.

[0088] Moreover, even when the blinding of inlet-port passage 112E by deposit of a sample occurs by setting the bore of inlet-port passage 112E to phi0.2mm, the reuse of a flow cell becomes possible only by exchanging tube 118E.

[0089] Since the bore of inlet-port passage was made small according to this operation gestalt even when the cel body made from a quartz was used as explained above, even if a flow rate becomes small, diffusion of the sample in inlet-port passage can be prevented.

[0090] Moreover, since the reuse of a flow cell becomes possible only by exchanging tubes, without exchanging the flow cell itself even when inlet-port passage produces blinding, exchange costs can be made cheap.

[0091] Next, the liquid chromatograph equipment by the 7th operation gestalt of this invention is explained using drawing 14 . Drawing 14 shows the cross-section configuration of the flow cell by this operation gestalt. In addition, the whole liquid chromatograph equipment configuration by this operation gestalt is the same as that of what was shown in drawing 1 . Moreover, the same sign as drawing 2 shows the same part.

[0092] Flow cell 100F are constituted by the transparent aperture material 150,152 made from a quartz by which optical adhesion was carried out cel body 110F made from a black quartz, and cel body 110F. Cel body 110F are equipped with inlet-port passage 112F arranged in the shape of Z character, the detection passage 114, and the outlet passage 116. In addition, in this operation gestalt, it connects with the detection passage 114 and the inlet-port passage 112 and the outlet passage 116 have not prepared the connection slot as shown in drawing 2 directly.

[0093] Inlet-port passage 112F insert tube 118F made from 4 fluoridation ethylene, and are having inlet-port passage 112F formed of the through hole of tube 118F into the hole by which the perforating process was beforehand carried out by the tool of an ultrasonic rotary processing machine. Here, in order to insert tube 118F, the hole formed in cel body 110F is phi0.5mm, and has processed the path by the side of the detection passage 114 in the shape of [of tapers 1/10] a taper. To the through hole of the shape of this taper, by diameter phiof tip0.55mm, tube 118F of tapers 1/10 are inserted, and insertion of

tube 118F stops with fitting of the taper section. After inserting tube 118F in a taper-like through hole, in the condition of having stopped, by pushing the edge of which tube 118F are sticking out, tube 118F deform plastically, the external surface of tube 118F sticks to the internal surface of the hole for inlet-port passage formation, and inlet-port passage 112F are formed inside tube 118F.
[0094] The bore of the detection passage 114 is phi0.75mm, and since the quantity of light of detection light did not become less, a S/N ratio was not able to fall and the bore which is inlet-port passage 112F was made small with phi0.2mm, even if a flow rate becomes small, diffusion of the sample in inlet-port passage can be prevented.
[0095] Moreover, even when the blinding of inlet-port passage 112F by deposit of a sample occurs by setting the bore of inlet-port passage 112F to phi0.2mm, the reuse of a flow cell becomes possible only by exchanging tube 118F.
[0096] Since the bore of inlet-port passage was made small according to this operation gestalt even when the cel body made from a quartz was used as explained above, even if a flow rate becomes small, diffusion of the sample in inlet-port passage can be prevented.
[0097] Moreover, since the reuse of a flow cell becomes possible only by exchanging tubes, without exchanging the flow cell itself even when inlet-port passage produces blinding, exchange costs can be made cheap.
[0098] Next, the liquid chromatograph equipment by the 8th operation gestalt of this invention is explained using drawing 15 and drawing 16 . Drawing 15 shows the cross-section configuration of the flow cell by this operation gestalt, and drawing 16 shows the right lateral of drawing 15 . In addition, the whole liquid chromatograph equipment configuration by this operation gestalt is the same as that of what was shown in drawing 1 . Moreover, the same sign as drawing 2 and drawing 3 shows the same part.
[0099] Flow cell 100G are constituted by the transparent aperture material 150,152 made from a quartz by which optical adhesion was carried out cel body 110G made from a black quartz, and cel body 110G. Cel body 110G are equipped with inlet-port passage 112G arranged in the shape of Z character, the detection passage 114, and the outlet passage 116. Inlet-port passage 112G and the detection passage 114 are connected by the connection slot 120, and the detection passage 114 and the outlet passage 116 are connected by the connection slot 122.
[0100] Inlet-port passage 112G are the hole by which the perforating process was beforehand carried out by the tool of an ultrasonic rotary processing machine, and the bore is set to phi0.5mm. The bore of the detection passage 114 is phi0.75mm, and since the quantity of light of detection light does not become less, a S/N ratio does not fall.
[0101] Furthermore, in this operation gestalt, since he is trying to connect the detection passage 114 with inlet-port passage 112G using the connection slot 120, and a sample stops being able to pile up easily in the connection parts of inlet-port passage 112G and the detection passage 114, it is lost that a sample is spread.
[0102] As explained above, according to this operation gestalt, it is lost by passing a sample from a 2-way to detection passage that a sample is spread in the connection of inlet-port passage and detection passage so that inlet-port passage and detection passage may be connected by the connection slot.
[0103] Next, the liquid chromatograph equipment by the 9th operation gestalt of this invention is explained using drawing 17 . Drawing 17 shows the cross-section configuration of the flow cell by this operation gestalt. In addition, the whole liquid chromatograph equipment configuration by this operation gestalt is the same as that of what was shown in drawing 1 . Moreover, the same sign as drawing 2 and drawing 3 shows the same part.
[0104] Flow cell 100H are constituted by the transparent aperture material 150,152 made from a quartz by which optical adhesion was carried out cel body 110H made from a black quartz, and cel body 110H. Cel body 110H are equipped with inlet-port passage 112H arranged in the shape of Z character, the detection passage 114, and the outlet passage 116. Inlet-port passage 112H and the detection passage 114 are connected by the band-like connection passage 126.
[0105] Inlet-port passage 112H insert tube 118H made from 4 fluoridation ethylene, and are having

inlet-port passage 112H formed of the through hole of tube 118H into the hole by which the perforating process was beforehand carried out by the tool of an ultrasonic rotary processing machine. Here, in order to insert tube 118H, completely, it does not penetrate but the tip of the hole formed in cel body 110H serves as a stopper to the point of tube 118H. After inserting tube 118H into the hole for inlet-port passage formation, by pushing the edge of which tube 118H are sticking out, tube 118H deform plastically, the external surface of tube 118H sticks to the internal surface of the hole for inlet-port passage formation, and inlet-port passage 112H are formed inside tube 118H.

[0106] The bore of the detection passage 114 is phi0.75mm, and since the quantity of light of detection light did not become less, a S/N ratio was not able to fall and the bore which is inlet-port passage 112H was made small with phi0.2mm, even if a flow rate becomes small, diffusion of the sample in inlet-port passage can be prevented.

[0107] Moreover, even when the blinding of inlet-port passage 112H by deposit of a sample occurs by setting the bore of inlet-port passage 112H to phi0.2mm, the reuse of a flow cell becomes possible only by exchanging tube 118H.

[0108] Since the bore of inlet-port passage was made small even when the cel body made from a quartz was used while processing of the hole which inserts a tube became easy according to this operation gestalt, as explained above, even if a flow rate becomes small, diffusion of the sample in inlet-port passage can be prevented.

[0109] Moreover, since the reuse of a flow cell becomes possible only by exchanging tubes, without exchanging the flow cell itself even when inlet-port passage produces blinding, exchange costs can be made cheap.

[0110] Next, the liquid chromatograph equipment by the 10th operation gestalt of this invention is explained using drawing 18 . Drawing 18 shows the cross-section configuration of the flow cell by this operation gestalt. In addition, the whole liquid chromatograph equipment configuration by this operation gestalt is the same as that of what was shown in drawing 1 . Moreover, the same sign as drawing 2 shows the same part.

[0111] In this operation gestalt, cel body 110I is manufactured with stainless steel, and the hole which inserts tube 118I in order to form inlet-port passage is processed on the hole with a stage.

[0112] Flow cell 100I is constituted by the transparent aperture material 150,152 made from a quartz fixed by the aperture presser foot 160,162 to cel body 110I made from stainless steel, and cel body 110I. Cel body 110I is equipped with inlet-port passage 112I arranged in the shape of Z character, the detection passage 114, and the outlet passage 116. In addition, in this operation gestalt, the inlet-port passage 112 and the outlet passage 116 are directly connected to the detection passage 114.

[0113] Inlet-port passage 112I inserts tube 118I made from 4 fluoridation ethylene, and is having inlet-port passage 112I formed of the through hole of tube 118I into the hole by which the perforating process was beforehand carried out with the drill. Here, in order to insert tube 118I, the hole formed in cel body 110I is used as the hole with a stage which has the section 124 with a stage on the way while it is a through hole. By inserting tube 118I in this through hole, and pushing the edge of which tube 118I is sticking out, after the tip of tube 118I has stopped in the section 124 with a stage, tube 118I deforms plastically, the external surface of tube 118I sticks to the internal surface of the hole for inlet-port passage formation, and inlet-port passage 112I is formed inside tube 118I.

[0114] The bore of the detection passage 114 is phi0.75mm, and since the quantity of light of detection light did not become less, a S/N ratio was not able to fall and the bore of inlet-port passage 112I was made small with phi0.2mm, even if a flow rate becomes small, diffusion of the sample in inlet-port passage can be prevented.

[0115] Moreover, even when the blinding of inlet-port passage 112I by deposit of a sample occurs by setting the bore of inlet-port passage 112I to phi0.2mm, the reuse of a flow cell becomes possible only by exchanging tube 118I.

[0116] Since the reuse of a flow cell becomes possible only by exchanging tubes according to this operation gestalt, without exchanging the flow cell itself even when inlet-port passage produces blinding as explained above, exchange costs can be made cheap.

[0117] Next, the liquid chromatograph equipment by the 11th operation gestalt of this invention is explained using drawing 19 and drawing 20 . Drawing 19 shows the cross-section configuration of the flow cell by this operation gestalt, and drawing 20 shows the right lateral of drawing 19 . In addition, the whole liquid chromatograph equipment configuration by this operation gestalt is the same as that of what was shown in drawing 1 . Moreover, the same sign as drawing 2 and drawing 3 shows the same part.
[0118] Flow cell 100J are constituted by the transparent aperture material 150,152 made from a quartz fixed by the aperture presser foot 160,162 to cel body 110J made from stainless steel, and cel body 110J. Cel body 110J are equipped with inlet-port passage 112J arranged in the shape of Z character, the detection passage 114, and the outlet passage 116. Inlet-port passage 112J and the detection passage 114 are connected by the connection slot 120, and the detection passage 114 and the outlet passage 116 are connected by the connection slot 122.
[0119] The bore of the detection passage 114 is phi0.75mm, and since the quantity of light of detection light did not become less, a S/N ratio was not able to fall and the bore which is inlet-port passage 112J was made small with phi0.2mm, even if a flow rate becomes small, diffusion of the sample in inlet-port passage can be prevented.
[0120] Furthermore, in this operation gestalt, since he is trying to connect the detection passage 114 with inlet-port passage 112J using the connection slot 120, and a sample stops being able to pile up easily in the connection parts of inlet-port passage 112J and the detection passage 114, it is lost that a sample is spread.
[0121] Since the bore of inlet-port passage was made small even when the cel body made from a quartz was used while processing of the hole which inserts a tube became easy according to this operation gestalt, as explained above, even if a flow rate becomes small, diffusion of the sample in inlet-port passage can be prevented.
[0122] Moreover, it is lost by passing a sample from a 2-way to detection passage that a sample is spread in the connection of inlet-port passage and detection passage so that inlet-port passage and detection passage may be connected by the connection slot.
[0123] Next, the liquid chromatograph equipment by the 12th operation gestalt of this invention is explained using drawing 21 and drawing 22 . Drawing 21 shows the cross-section configuration of the flow cell by this operation gestalt, and drawing 22 shows the right lateral of drawing 21 . In addition, the whole liquid chromatograph equipment configuration by this operation gestalt is the same as that of what was shown in drawing 1 . Moreover, the same sign as drawing 2 and drawing 3 shows the same part.
[0124] Flow cell 100K are constituted by the transparent aperture material 150,152 made from a quartz fixed by the aperture presser foot 160,162 to cel body 110K made from stainless steel, and cel body 110K. Cel body 110K are equipped with inlet-port passage 112K arranged in the shape of Z character, the detection passage 114, and the outlet passage 116. Inlet-port passage 112K and the detection passage 114 are connected by the connection slot 128, and the detection passage 114 and the outlet passage 116 are connected by the connection slot 129. The connection slot 128 and the connection slot 129 serve as the same configuration.
[0125] As shown in drawing 22 , the connection slot 128 is an annular slot on rectangular. The edge of inlet-port passage 112K is carrying out opening, and is connected to the lower limit side of illustration into the connection slot 128 by the upper limit side of illustration of the connection slot 128 in the detection passage 114. That is, 2 ****s of the passage from inlet-port passage 112K to the detection passage 114 are set to connection slot 128A and connection slot 128B. The sample which flowed out of the edge of inlet-port passage 112K into the connection slot 128 serves as flow which joins in the edge of the detection passage 114, after being shunted toward connection slot 128A and connection slot 128B. In the unification section, the flow of two samples will join and it will flow into the detection passage 114 after that. That is, since a sample will flow into the detection passage 114 from a 2-way and a sample stops being able to pile up in it easily, it is lost that the sample by the stagnation section of the flow of a sample arising in the connection of inlet-port passage and detection passage is spread like

before.
[0126] The bore of the detection passage 114 is phi0.75mm, and since the quantity of light of detection light did not become less, a S/N ratio was not able to fall and the bore which is inlet-port passage 112K was made small with phi0.2mm, even if a flow rate becomes small, diffusion of the sample in inlet-port passage can be prevented.
[0127] Furthermore, in this operation gestalt, since he is trying to connect the detection passage 114 with inlet-port passage 112K using the connection slot 128, and a sample stops being able to pile up easily in the connection parts of inlet-port passage 112K and the detection passage 114, it is lost that a sample is spread.
[0128] Since the bore of inlet-port passage was made small even when the cel body made from a quartz was used while processing of the hole which inserts a tube became easy according to this operation gestalt, as explained above, diffusion of the sample in inlet-port passage can be prevented.
[0129] Moreover, it is lost by passing a sample from a 2-way to detection passage that a sample is spread in the connection of inlet-port passage and detection passage so that inlet-port passage and detection passage may be connected by the connection slot.
[0130] As explained above, according to each operation gestalt of this invention, by pressing a tube fit in 1 inlet-port passage, the inlet-port passage volume decreases compared with the inlet-port passage of the conventional flow cell made from a quartz, and diffusion of the sample in inlet-port passage decreases. 2) When the tube of inlet-port passage is got blocked by pressing a tube fit in inlet-port passage, it can correct easily by retubing. 3) By using as 4 fluoridation ethylene the tube quality of the material pressed fit in inlet-port passage, plugging of the inlet-port passage by the sludge can be prevented. 4) By preparing two or more passage slots which connect entrance passage and detection passage, the stagnation section of flow decreases and diffusion of the sample in detection passage decreases. 5) By making into the shape of a ring the passage slot which connects entrance passage and detection passage, it is processible by low cost with an ultrasonic rotary processing machine. 6) Since there is much quantity of light of detection light compared with the flow cell which made the path of detection passage small and reduced diffusion of a sample, the S/N ratio of a detecting signal is high and the noise of chromatogram becomes small.
[0131]
[Effect of the Invention] According to this invention, it becomes reusable, without exchanging the flow cell itself also to plugging of the passage of the flow cell used for liquid chromatograph equipment.
[0132] Moreover, according to this invention, the diameter of inlet-port passage of the flow cell made from a quartz used for liquid chromatograph equipment can be made small.
[0133] Furthermore, according to this invention, the residual of a sample can be lessened even if it does not make small the path of the inlet-port passage of the flow cell used for liquid chromatograph equipment.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the block diagram showing the whole liquid chromatograph equipment configuration by 1 operation gestalt of this invention.
[Drawing 2] It is the sectional view showing the cross-section configuration of the flow cell used for the liquid chromatograph equipment by 1 operation gestalt of this invention.
[Drawing 3] It is the right side view of drawing 2 .
[Drawing 4] It is the sectional view of the tool of the ultrasonic rotary processing machine for connection slot formation of the flow cell of the liquid chromatograph equipment by 1 operation gestalt of this invention.
[Drawing 5] It is the explanatory view of the FUROMATO gram obtained by the liquid chromatograph equipment by 1 operation gestalt of this invention.
[Drawing 6] It is the sectional view of a flow cell used for the liquid chromatograph equipment by the 2nd operation gestalt of this invention.
[Drawing 7] It is the right side view of drawing 6 .
[Drawing 8] It is the sectional view of a flow cell used for the liquid chromatograph equipment by the 3rd operation gestalt of this invention.
[Drawing 9] Drawing 9 is the right side view of drawing 8 .
[Drawing 10] It is the sectional view of a flow cell used for the liquid chromatograph equipment by the 4th operation gestalt of this invention.
[Drawing 11] It is the sectional view of the tool of the ultrasonic rotary processing machine for the hole formation with a stage of the flow cell of the liquid chromatograph equipment by 1 operation gestalt of this invention.
[Drawing 12] It is the sectional view of a flow cell used for the liquid chromatograph equipment by the 5th operation gestalt of this invention.
[Drawing 13] It is the sectional view of a flow cell used for the liquid chromatograph equipment by the 6th operation gestalt of this invention.
[Drawing 14] It is the sectional view of a flow cell used for the liquid chromatograph equipment by the 7th operation gestalt of this invention.
[Drawing 15] It is the sectional view of a flow cell used for the liquid chromatograph equipment by the 8th operation gestalt of this invention.
[Drawing 16] It is the right side view of drawing 15 .
[Drawing 17] It is the sectional view of a flow cell used for the liquid chromatograph equipment by the 9th operation gestalt of this invention.
[Drawing 18] It is the sectional view of a flow cell used for the liquid chromatograph equipment by the 10th operation gestalt of this invention.
[Drawing 19] It is the sectional view of a flow cell used for the liquid chromatograph equipment by the 11th operation gestalt of this invention.
[Drawing 20] It is the right side view of drawing 19 .

[Drawing 21] It is the sectional view of a flow cell used for the liquid chromatograph equipment by the 12th operation gestalt of this invention.
[Drawing 22] It is the right side view of drawing 21 .
[Description of Notations]
10 12 -- Eluate
20 22 -- Pump
30 -- Sample injector
32 -- Sample
34 -- Syringe
36 -- Needle
38 -- High-pressure passage change bulb
40 -- Column incubator
42 -- Column
60 -- Penetrant remover
62 -- Waste fluid bottle
100 -- Flow cell
110 -- Cel body
112 -- Inlet-port passage
114 -- Detection passage
116 -- Outlet passage
118 -- Tube
120,122,128,129 -- Connection slot
150,152 -- Aperture material

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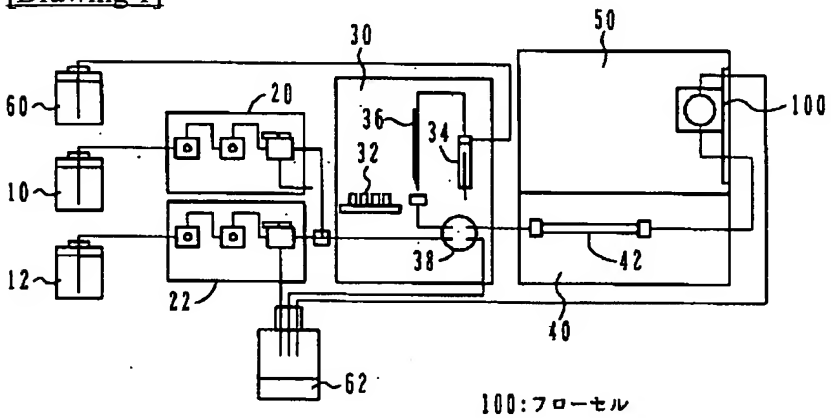
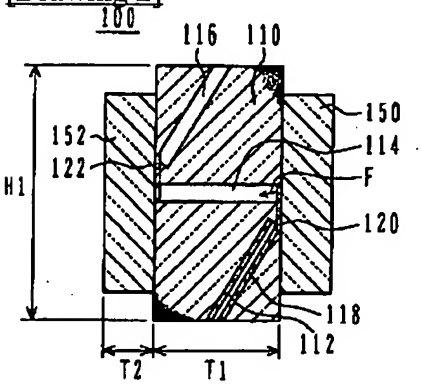
DRAWINGS

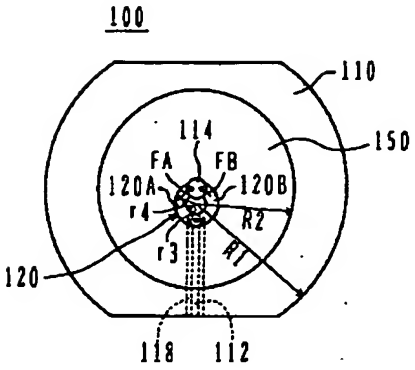
[Drawing 1]



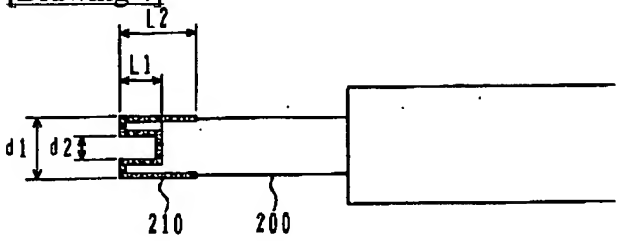
[Drawing 2]



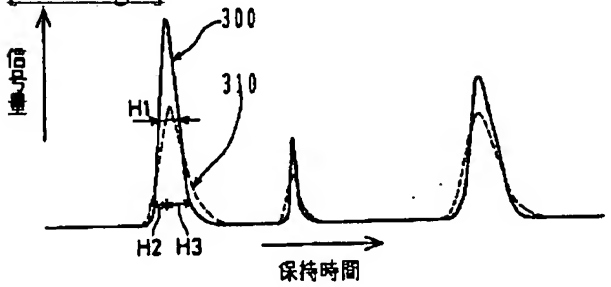
[Drawing 3]



[Drawing 4]



[Drawing 5]



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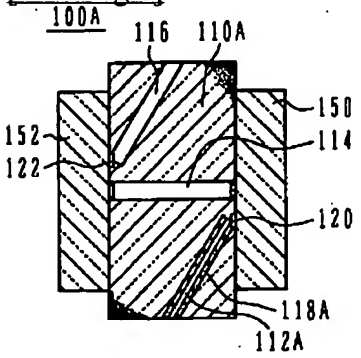
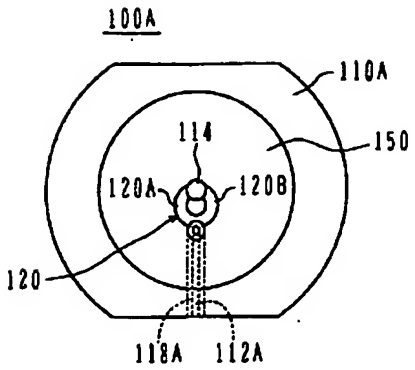
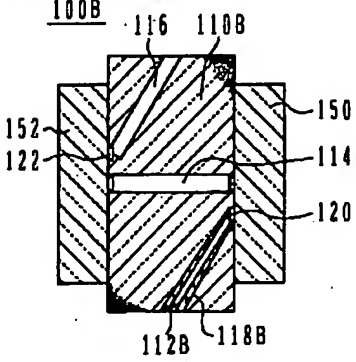


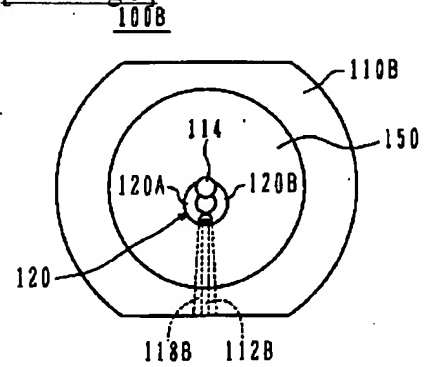
[Drawing 7]



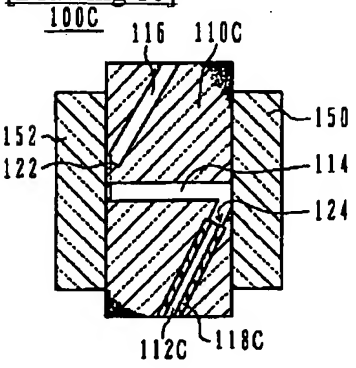
[Drawing 8]



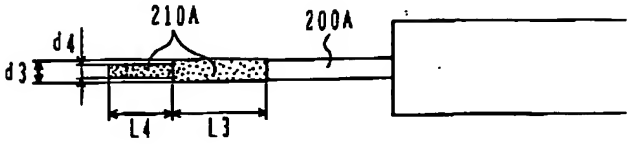
[Drawing 9]



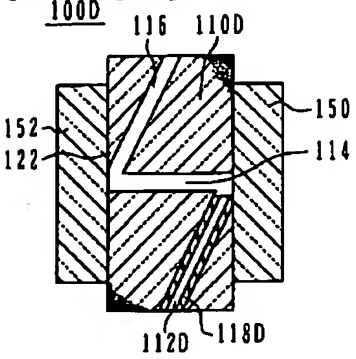
[Drawing 10]



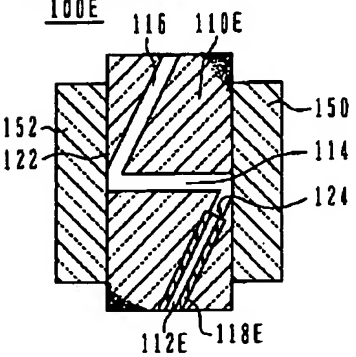
[Drawing 11]



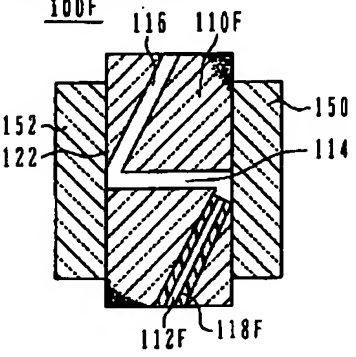
[Drawing 12]



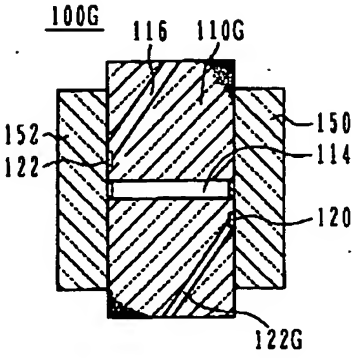
[Drawing 13]



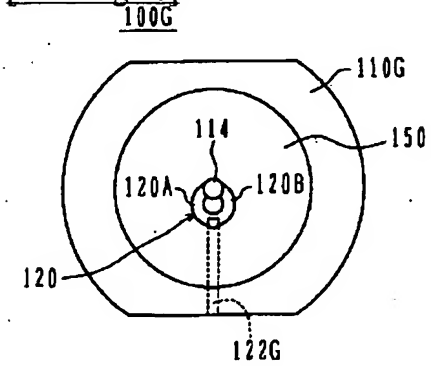
[Drawing 14]



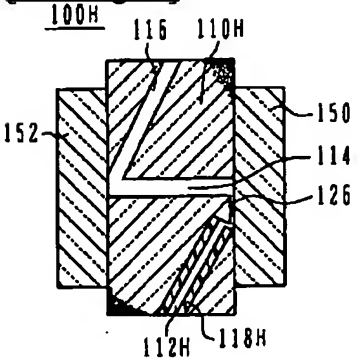
[Drawing 15]



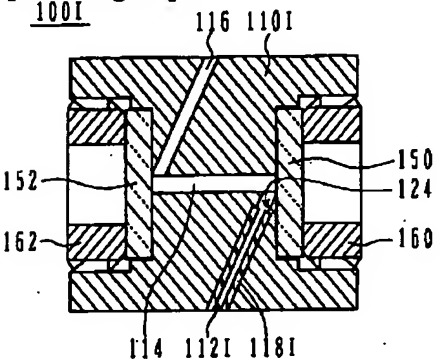
[Drawing 16]



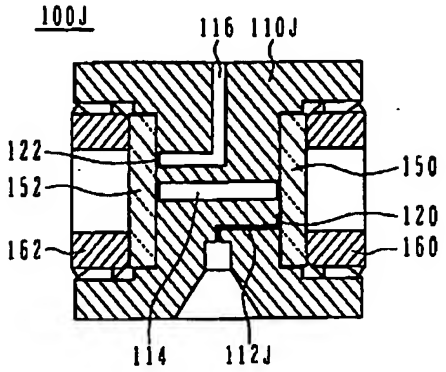
[Drawing 17]



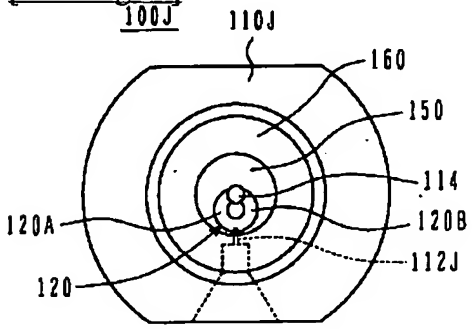
[Drawing 18]



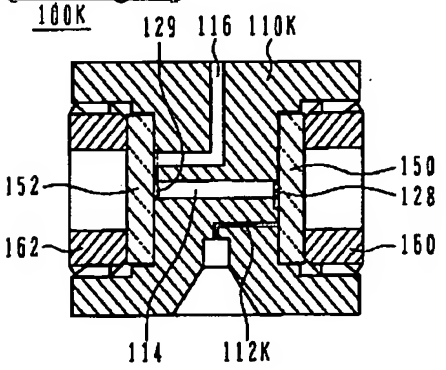
[Drawing 19]



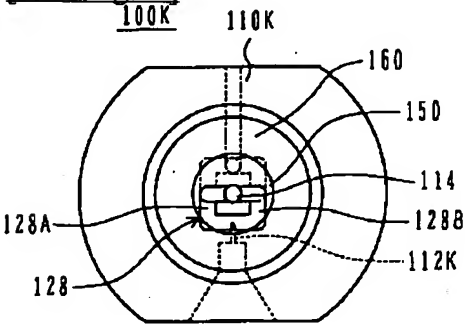
[Drawing 20]



[Drawing 21]



[Drawing 22]



[Translation done.]